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Dynamic Viscoelasticity of Individual Bacterial Cells VIRGINIA VADILLO-RODRIGUEZ, JOHN DUTCHER, University of Guelph — We have used an AFM-based approach to probe the mechanical properties of single bacterial cells (gram-negative *Escherichia coli* K12) by applying a constant compressive force to the cell under fluid conditions while measuring the time-dependent displacement (creep) of a colloidal AFM tip due to the viscoelastic properties of the cell. We observed that the cells exhibited a viscoelastic solid-like behavior with retarded elasticity, i.e. both an instantaneous and a delayed elastic deformation, which is well described by a three-parameter mechanical model. Using the best fit parameter values, we have calculated the dynamic viscoelastic behavior of the cells over a wide range of frequencies based on a numerical time-frequency transform technique and we have compared the calculated behavior with that measured experimentally. Comparison of the results obtained for *E. coli* with previously reported data on the mechanical properties of others gram-negative cells and their isolated surface layers suggests that the elastic component of the cell viscoelastic response is dominated by the properties of the peptidoglycan layer, whereas the viscous component likely arises from the liquid-like character of the cell membranes.

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